

## Peer Review File

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### Reviewer A

I have some comments

1. The manuscript lacks of endoscopic data (i.e. hernia size, esophagitis, etc.), high-resolution manometry and pH-impedance test data

Reply: We reported average hernia size on page 6, line 143, “The average pre-operative hernia size was 3.5cm.” We reported manometry data on page 6, line 143-145, “45.1% (n = 65) of patients underwent preoperative manometry. Of these patients, 51 had normal findings, and 14 had some degree of motility disorder.” We reported pH-impedance test data on page 6, lines 146-47, “17 patients underwent pH testing and had an average DeMeester score of 33.8.” Pre-operative work-up varied from patient to patient, as well as from surgeon-to-surgeon and surgeon-to-gastroenterologist. We will include more preoperative diagnostic data, please see changes.

Changes in the text: added to page 6, line 143, “95 patients underwent preoperative endoscopy and 23 (24%) had evidence of esophagitis. Of the 23 patients with esophagitis, 10 had Los Angeles (LA) grade A, 5 had LA grade B, 7 had LA grade C, and 1 had LA grade D esophagitis. Furthermore, of the 95 patients who underwent preoperative endoscopy, 88 (93%) had no evidence of metaplasia, 5 (5%) had low grade dysplasia, and 2 (2%) had high grade dysplasia.” Added to page 6, line 145, “The average lower esophageal sphincter resting pressure was 22 mmHg (standard deviation [SD] 14 mmHg). 4 patients of the 65 patients (6%) had 100% failed swallows, 3 patients (5%) had 50-70% failed swallows, 7 patients (11%) had 10-30% failed swallow, and the rest (51 patients, 78%) had no failed swallows on manometry.”

2. How many patients had a type III-IV hernia?

Reply: Please see page 6, lines 145-146.

Changes in the text: There were 89 Type 4I hernias, 23 Type 2II hernias, 30 Type 3III hernias, and 2 Type 4IV hernias.

3. The technique for fundoplication was heterogeneous

Reply: We agree that dissection techniques differ from surgeon-to-surgeon and the choice of fundoplication varied but the focus of our paper is that all surgeons used the same hiatal closure technique.

Changes in the text: page 5, lines 113-114: The surgical technique for hiatal closure was standard amongst the six surgeons performing the robotic operation – approximation with a running V-loc and reinforcement with interrupted silk suture.

4. The follow-up was considered in the very short-term

Reply: We acknowledged this as a limitation of the study in page 10, lines 231-232. This is a new, unpublished technique that has promising results that we would like to share with the scientific community. We continue to follow these patients and assess them for complications. Changes in the text: None

5. Definition for hernia recurrence?

Reply: Please see page 8, lines 178-179, “Recurrences were based on any radiographic evidence of post-operative hernia on barium swallow, computed tomography scan, or endoscopy.”

Changes in the text: None

6. Symptoms were assessed heterogeneously. A validated questionnaires would have been used

Reply: We acknowledged this was a limitation of our study due to the retrospective nature of the study, please see page 10, lines 233-235. It is not possible at this time to obtain this data.

Changes in the text: None

7. Why did you not consider the placement of a mesh for crural buttressing?

Reply: We do not use mesh due to their feared complications and lack of consistent benefit, increased cost, and longer operative time. We find that even without mesh, we are able to bring the crural together for adequate repair with low recurrence rates as we presented in this article. Changes in the text: Page 3 line 68 changed/added “The potential short-term benefit outweighing the long-term risk from mesh remains uncertain. In recent meta-analysis and systematic reviews, the benefit of mesh continues to be debated. Angeramo et. al investigated 7 random control trials looking at recurrence rate between primary repair and mesh reinforcement. The authors found no significant difference in recurrence or reoperation rates between the two groups and when stratifying between absorbable and nonabsorbable mesh, the only significance is the higher morbidity in nonabsorbable mesh population [4]. Another Meta-analysis by Sathasivam et. al. which looked at 9 studies reported lower recurrences when comparing mesh vs suture repair. However, the type of mesh used, absorbable vs nonabsorbable, and early vs late recurrence was not reported [5]”.

8. Conclusions are not supported by the data you presented

Reply: From our experience, and the recurrence rate requiring re-operation of 4.2% we feel this method of primary closure is successful for an average follow up of ~10 months for this data. We continue to follow these patients and feel this technique provides a durable repair. Text changed on page 11: “Although operative time is higher, the robotic approach has similar lengths of stay and complications compared to nationally published data on laparoscopic hiatal hernia repairs”

For all these reasons, I believe the paper has not sufficient priority to be possibly considered for acceptance in JTD

## Reviewer B

Sadeghi et al in their manuscript, “robotic hiatal hernia repair without mesh,” describe their series of 144 patients undergoing the operation. My comments/questions/below:

The investigators have demonstrated excellent results with their technique. The fact that all V-loc sutures were intact at the time of reoperation is interesting, albeit only 6 patients required reoperation. One somewhat misleading aspect of the study, however, is the fact that the studies on LARGE hiatal hernias are referenced as a comparison. However, the majority (N=89) of cases in this study were type I hiatal hernias, for which the anticipated success rate would be higher and the recurrence rate would be lower. I recommend adding this as a limitation/caveat in the discussion.

Reply: We agree that the majority of patients had type I hernias. There were 30 Type III and 2 Type IV hernias in which this method of hiatus closure was successful - these patients did not have disproportionately higher recurrence rates which leads us to believe this method is just as successful for large hiatal hernias.

Changes: Page 10, line 233 added, “Another limitation was the small number of larger hernias (30 type III’s, and 2 type IV’s) which narrows the applicability of the results.” Page 9 line 206 added “Interestingly, the size of hernia did not affect the recurrence rate.”

There are a number of word choice/punctuation errors (such as “;” instead of “,” in line 65, “rates” instead of “rate” in line 67, “is” instead of “of” in line 68). This entire manuscript needs to be re-read closely and edited for these issues.

Reply: The manuscript has been re-read for edits.

Changes:

page 3, line 65, “;” changed to “,”

page 3, line 67 “rates” changed to “rate.” page 3, line 68 “is” changed to “of.” Page 3 “reliable”

changed to “reliably.”

Page 9, line 224 change “Based on the results, we have also found..” to “Based on these results, we found...”

Page 7, line 154, “comorbidity” spelling. Line 155 “intra-operative” changes to “intraoperative.”

page 2, line 52 “re-operation” changed to “reoperation.”

Page 3, line 73 “HH” changed to “hiatal hernia”

Page 5, line 108 “commuted” changed to “computed.”

Page 6, line 134 “post-operative” changed to “postoperative.”

Page 6, line 144 “pre-operative” changed to “preoperative.”

Page 6, line 147 “pre-operative” changed to “preoperative.”

Page 6, line 160, changed “(standard deviation [SD] 62)” to “(SD 62 minutes)”

Page 7, line 167 “post operative” changed to “postoperative.”

Page 8, line 185 “re-operation” changed to “reoperation.”

Page 8, lines 199 and 203 added “the”

Page 9, line 202, “statistically” spelling.

Page 9, line 205, change “prolong” to “prolonged.”

Page 10, line 232 changed “methods” to “method.”

The lines “In our practice... benefits” (lines 89-93) would be characterized as results and should be deleted from the Introduction.

Reply: We agree - we moved it to the discussion.

Changes: Moved lines 89 from page 3 “In our practice... elective setting” to page 9 line 223.

Deleted lines 90-93 from page 3, “We also found that .... potential benefits.”

“No patients... laparoscopy” (lines 114-115) belongs in the results section.

Reply: Agreed.

Changes: Moved lines 114-115 from page 3 to page 7 line 160.

“Patients followed... indicated” (lines 115-117) should be relocated to the end of the technique section.

Reply: Agreed.

Changes: Lines 115-117 from page 5 moved to line 137 on page 6.

I am unclear on why urgent and emergent cases excluded. Were they approached in a different manner from a surgical perspective/technique? A clearer understanding of robotic hiatal hernia repair would be achieved by including them.

Reply: Please see page 10, line 227, “We felt that patients presenting...” We attempted to isolate only patients with hiatal hernia as a primary reason for hospital stay. Urgent cases tended to have patients who were admitted for other reasons and incidentally found to have hernias needing repair which obscured our data. Furthermore, to aid in future patient selection we attempted to keep the selection criteria specific as emergency cases can differ in many regards. Changes in the text: Page 10, line 230 added, “The heterogeneous nature of emergencies prevented us from deriving meaningful conclusions.”

The investigators state that reoperative cases were excluded (line 104), however in Figure 1 and line 141 state that 10 patients had prior hiatal hernia repair. Please correct.

Reply: Only urgent and emergent cases were excluded, not reoperations - it has been corrected.

Changes: Page 5, line 104 “urgent...” changed to “Emergency cases, and patients previously admitted to the hospital who underwent the procedure, were excluded from this study; strictly elective cases were investigated.”

I am surprised that there was no use of mesh at all in the series. Can the investigators comment on this? Were these cases excluded for the series?

Reply: No mesh was used during the listed time period of the study, all elective cases were

closed via the described method. The described method we put forward allows for mesh-less closure with durable results. Mesh cases were not excluded.

Changes: Page 7, line 160 added, “No patients required mesh placement.”

I am surprised that more patients did not undergo preoperative imaging. It is unusual that just over 50% of patients had any form of imaging. Please comment.

Reply: Pre-operative work-up varied from patient to patient, as well as from surgeon-to-surgeon and surgeon-to-gastroenterologist. We have included more preoperative diagnostic data, please see changes.

Changes in the text: added to page 6, line 143, “95 patients underwent preoperative endoscopy and 23 (24%) had evidence of esophagitis. Of the 23 patients with esophagitis, 10 had Los Angeles (LA) grade A, 5 had LA grade B, 7 had LA grade C, and 1 had LA grade D esophagitis. Furthermore, of the 95 patients who underwent preoperative endoscopy, 88 (93%) had no evidence of metaplasia, 5 (5%) had low grade dysplasia, and 2 (2%) had high grade dysplasia.”

Please specify the motility disorders found on manometry.

Reply: We do not routinely obtain manometry on patients who were diagnosed with endoscopy which accounts for the relatively low numbers.

Changes: Added to page 6, line 145, “The average lower esophageal sphincter resting pressure was 22 mmHg (standard deviation [SD] 14 mmHg). 4 patients of the 65 patients (6%) had 100% failed swallows, 3 patients (5%) had 50-70% failed swallows, 7 patients (11%) had 10-30% failed swallow, and the rest (51 patients, 78%) had no failed swallows on manometry.”

I am curious about whether or not a gastropexy of some kind is added to the fundoplication. Some surgeons suture the fundoplication to the diaphragmatic crus. Was this done in any, some, or all cases? How is V-loc suture used? Is the repair started from the top of the posterior aspect of the hiatus or the bottom? Is one suture or two used? Is the suture tied or just oversewn to prevent it from loosening? Please comment.

Reply: No gastropexies were performed. A single V-loc is started on the inferior aspect of the hiatus and secured through its own loop. The V-loc is run superiorly towards the esophagus. Extra suture is oversewn inferiorly on the hiatus and the end is cut. The barbs on the suture hold it in place and do not require tying.

Changes: Page 7, line 156 added “and no gastropexies were performed.”

Page 6, line 129 “- secured through its own loop.”

Page 6, line 130 “Extra suture is oversewn back towards the base, and the end is left free after the needle is cut off. The barbs hold the suture in place and does not require a knot.”

“Extra suture is oversewn back down towards the base, and the end is left free after the needle is cut off. The barbs hold the suture in place and do not require a knot”

I am surprised that 11% of patients required a pigtail catheter. In the absence of a lung injury, typically these situations represent a “capnothorax” rather than a pneumothorax and will improve with observation alone as the carbon dioxide is reabsorbed. Have the investigators considered waiting/repeating a chest radiograph rather than immediately placing a pigtail catheter?

Reply: A majority of the time the capnothorax is suspected and treated on table while the patient is under anesthesia - we feel this does not significantly increase the OR room time and the caliber of the pigtail is relatively painless once the patient wakes up, which spares them a potential procedure while they are awake.

Page 7, line 166 “pneumothorax” changed to “capnothorax”

page 10, line 241 and 244 “pneumothorax” changed to “capnothorax”

Page 16, line 334 “pneumothorax” changed to “capnothorax”

Do the investigators routinely open one or both pleural spaces during the operation?

Reply: We do not routinely or intentionally open the pleural spaces during the operation. While this was the most common complication, there were not any associated injuries to the

surrounding structures. Many patients presented with many years of symptoms which may have contributed to increased difficulty of the dissection. Furthermore, we routinely perform esophageal mobilization high in the chest which likely contributes to this complication as well but has the benefit of esophageal lengthening without requiring collis gastroplasties. Lastly, we have not found a commonly accepted capnothorax rate for reference.

Changes in the text: None

There are frequent incidences in the text where no percentage is provided next to an absolute number. In many of these situations, indicating the percentage would be useful.

Please address while ensuring that the denominator with which the percentage is calculated remains appropriate.

Reply: Percentages have been added to absolute numbers to give clearer context.

Changes in text: Page 2, line 48, added “(66%)”. Page 6, line 140 added “(61%)”, line 141 added “(14%)”, “(55%)”, line 142 added “(21%)”, “(31%)”, line 143 added “(3.4%)”, line 144 added “(78%)” and “(22%)”, line 145 added “(62%)”, “(16%)”, “(21%)”; line 146 added “(1.4%)”, “(12%)”. Page 7 line 155 added “(55%)”, “(31%)”, “(14%)”, line 159 added “(2%)”, line 162 added “(98%)”, “(65%)”, line 163 added “(17%)”, line 164 added “(18%)”, line 166 replaced “(11.11)” with “(11%)”, line 168 added “(95%)”, line added “(5%)”, line 169 added “(7%)”, line 175 added “(2%)” and “(47%)”, line 176 added “(12%)”. Page 8, line 177 added “(28%)”, line 179 added “(69%)”, line 180 added “(18%)”, line 181 added “(10%)”, 182 added “(8%)”.

What type of hernia (I, II, III, or IV) did the 6 patients have who required reoperation / 15 patients who had a radiologic recurrences?

Reply: There were four Type I's, one Type III, and one Type IV. All re-herniations had the fundoplication through the hiatus - it is unclear how to categorize this and to avoid confusion we are omitting this information. (- No correlation with hiatal hernia type)

Changes: page 8, line 184 “The breakdown of initial hernia type for the patients who had operative recurrences is: 4 Type I's, 1 Type III, and 1 Type IV. The breakdown of initial hernia type for patients who had radiologic recurrences is: 8 type I's, 6 Type III's, and 1 Type IV.”

Were the 6 recurrences requiring reoperation included in the 10 patients who had small symptomatic recurrences? Or is this a separate group?

Reply - They were part of the 10 patients that had symptomatic recurrences

Changes: Page 8, line 184, “Of the 10 symptomatic recurrences...”

The total #/% of radiologic recurrence (regardless of whether or not they needed a reoperation) is unclear.

Reply: Please see page 8 lines 178-180, “Recurrences were based on any radiographic evidence of post-operative hernia on barium swallow, computed tomography scan, or endoscopy.” and lines 182 - 184, “10 (6.9%) 183 patients had small symptomatic recurrences and 5 (3.5%) patients had small asymptomatic 184 recurrences.”

Changes in the text: page 8, line 142-143. “Of the remaining 15 patients (3 patients lost to follow up), ...”

Did any patients have early postoperative recurrences?

Reply: No, there were no early symptomatic or asymptomatic recurrences. The earliest recurrence requiring reoperation was 217 days.

Changes in the text: page 8, line 192, “There were no early (<30 days) symptomatic or asymptomatic recurrences, and...”

The investigators mention 4 patients with dysphagia – how were these patients handled?

Reply: All patients underwent esophagogastroduodenoscopy upon readmission by the gastroenterology team. One of these patients was found to have a small food impaction.

Changes in the text: page 7, line 172, “... and underwent esophagogastroduodenoscopy upon

readmission by the gastroenterology team. One of these patients was found to have a small food impaction.”

Was there a BMI cutoff above which surgery was not offered?

Reply: We reported the BMI of the patients, there was not a strict BMI cutoff for the operation. The highest BMI was 51.36 and smallest was 18.31

Changes in the text: Page 6, line 140 added “(SD 6.09 Kg/m<sup>2</sup>)”

Did operative time vary by type I, II, III, vs IV hernia?

Reply: Average operative times for each type of hernia were as follows: Type I - 165 minutes, Type II - 211 minutes, Type III - 177 minutes, Type IV 201 minutes.

Changes in the text: Page 6, Line 160, “and the average operative times for each type of hernia were as follows: Type I - 165 minutes, Type II - 211 minutes, Type III - 177 minutes, Type IV 201 minutes.”

I believe figures 3 and 4 can be combined.

Reply: Agreed

Changes in the text: Table 4 added to the end of table 3

### **Reviewer C**

Thank you for providing this manuscript. We appreciate the authors' endeavors to describe their experiences with primary repair of the hiatus.

After reviewing the manuscript, there are several questions that come to mind.

1) The introduction cites multiple sources though does not provide adequate context to build the foundation for the argument the manuscript attempts to make: namely that the hiatus can be closed without mesh. In my view, providing references that describe the type of mesh used and why and importantly, the follow up interval, is critical. No doubt placing a non-biologic mesh in the hiatus is prone to complication, however many surgeons have utilized biologic mesh with good results. Perhaps the introduction would be strengthened if the authors considered incorporating data with long-term follow-up and also comment on reports detailing outcomes using biologic mesh.

Reply: Agreed

Changes in the text: Page 3 line 68 changed/added “The potential short-term benefit outweighing the long-term risk from mesh remains uncertain. In recent meta-analysis and systematic reviews, the benefit of mesh continues to be debated. Angeramo et. al investigated 7 random control trials looking at recurrence rate between primary repair and mesh reinforcement. The authors found no significant difference in recurrence or reoperation rates between the two groups and when stratifying between absorbable and nonabsorbable mesh, the only significance is the higher morbidity in nonabsorbable mesh population [4]. Another Meta-analysis by Sathasivam et. al. which looked at 9 studies reported lower recurrences when comparing mesh vs suture repair. However, the type of mesh used, absorbable vs nonabsorbable, and early vs late recurrence was not reported [5]”.

2)The authors detail use of the V-lock suture and reinforcement with 0-silk suture. However, there is little discussion provided that incorporates existing literature that detail primary closure of the hiatus and the result on long-term outcomes. For example, some surgeons close the hiatus with 0 ethibond sutures while others use #1 silk with and without pledgits. The addition of the V-lock may or may not add much to the repair. I believe the authors are trying to articulate there is no difference, though they do not present data describing the methods, including suture type, other surgeons utilize to close the hiatus. If this data is available, contrasting these

published results with the results presented in this manuscript (use of V-lock with interrupted silk has acceptable short-term outcomes) would strengthen the article.

Reply: We are stating that there is a difference. In the introduction we describe the high recurrence rates with primary closure that exist in the literature (page 3, line 67-68, “This is based on randomized control trials...”) which is drastically different from our recurrence rate. Our recurrence rate is lower than that of primary repair with pledgets. We do not feel the question of using silk vs. ethibond can be addressed in this study, but we will include a discussion of pledgets and nonabsorbable suture without pledgets.

Changes in the text: Added to page 9, line 213: “There are various methods of primary repair, the most common being interrupted nonabsorbable, braided sutures with or without PTFE pledgets. The use of nonabsorbable interrupted sutures without pledgets have been associated with high recurrence rates of 22-59%.(15) Another study of 217 laparoscopic primary repairs with braided, nonabsorbable, interrupted sutures had an operative recurrence rate of 9.9%.(16) Several recent studies detail the improved recurrence rates around 6.7-6.8% with the use of pledgets.(17, 18) While the pledgets seem to improve operative recurrence rates, they introduce nonabsorbable foreign material to the hiatus that is prone to erosion and migration. Dally and Falk identified 11 patients from a database that suffered from symptomatic pledget erosion causing symptoms including strictures, chest pain, and melena. 10 of these patients went on to receive surgery for pledget removal.(19)”

And this brings us to the discussion of mesh closure. The authors describe complications associated with mesh closure though they do not clarify which type of mesh the article refers to; biologic or non-biologic.

The authors do not present clear data describing recurrence outcomes (rate and over what time period) for studies that used biologic and non-biologic mesh.

Reply: Please see reply for comment number one of reviewer C.

This is important because the argument that the hiatus can be closed without any mesh is predicated on similar recurrence and complication outcomes over a similar period of time. Incorporating this into the manuscript would serve to strengthen the authors conclusion.

#### **Reviewer D**

Authors present their short-term results of an already established technique of hiatal closure which unfortunately has been abandoned in recent years due to high recurrence rates at long-term follow-up. Primarily the reason for failure was the use of absorbable sutures unless a mesh is placed.

Reply: In our study, we put forth the novel technique of using a combination of running an absorbable barbed suture to approximate the hiatus and relieve tension, then reinforcing the closure with interrupted non-absorbable sutures. Acknowledging the relatively short follow-up, we want to share our success with this method.

Changes in the text: Added to page 9, line 213: “There are various methods of primary repair...”

The weakness of this study is that the authors have not performed a randomized trial for justifying the superiority of their technique and experience. There are several shortcomings in this study.

Reply: We acknowledge this is a retrospective study (see P.2, L.42; P.5, L102, and P.10, L.235) which contributed to the shortcomings. We agree that retrospective studies will be inferior to randomized control trials. Nevertheless, we have found this technique to provide a durable repair without the use of mesh. We feel that a randomized trial will be the next step to compare this technique to other techniques.

Changes in the text: none.

Why are the authors against using a bioabsorbable mesh (BioA) which is commonly utilized?

It does not have complications of erosion etc as stated by the authors. I also agree that one may not use a mesh if the esophageal mobilization is excellent after mediastinal dissection.

Reply: We do not use mesh due to their feared complications and lack of consistent benefit, increased cost, and longer operative time. We find that even without mesh, we are able to bring the crural together for adequate repair with low recurrence rates as we presented in this article. Changes in the text: Page 3 line 68 changed/added “The potential short-term benefit outweighing the long-term risk from mesh remains uncertain. In recent meta-analysis and systematic reviews, the benefit of mesh continues to be debated. Angeramo et. al investigated 7 random control trials looking at recurrence rate between primary repair and mesh reinforcement. The authors found no significant difference in recurrence or reoperation rates between the two groups and when stratifying between absorbable and nonabsorbable mesh, the only significance is the higher morbidity in nonabsorbable mesh population [4]. Another Meta-analysis by Sathasivam et. al. which looked at 9 studies reported lower recurrences when comparing mesh vs suture repair. However, the type of mesh used, absorbable vs nonabsorbable, and early vs late recurrence was not reported [5]”.

Closure of the hiatus with a running V lok and then reinforcement with another interrupted silk suture is known to cause ischemia of the crus and the cause of recurrence in their cases. The adage “approximate don’t strangulate” still holds true for hiatal closure and is a cardinal Achilles heel for the durability of crural approximation.

Reply: one recurrence was due to a broken stitch, three due to anterior dilation of the hiatus (posterior hiatus intact), one due to re-herniation medially, and one due to re-herniation centrally (see P.8, L.184-188). We do not feel that ischemia was the cause of these operative recurrences as the repair was intact in all but one case which was a broken stitch.

Changes in the text: none.

How does the robot help the case in this study? The same technique could be performed laparoscopically.

Reply: We agree the same technique could be applied laparoscopically, further research is needed to compare the two methods. We feel the robot adds a higher level of acuity and dimension particularly when mobilizing the esophagus in the chest, laying the stitches on the hiatus, and performing the fundoplication. The mobilization aids with the meshless closure. see page 4, lines 82- 90 “Furthermore, surgeons are increasingly utilizing the robotic platform...” Changes in the text: added to page 9, line 233, “The robot adds a high level of acuity and dimension particularly when mobilizing the esophagus in the chest, laying the stitches on the hiatus, and performing the fundoplication. The mobilization aids with the meshless closure.”

Follow-up is noticeably short. Usually, a 5 to 10-year follow-up is taken as a reasonable time to assess for recurrences.

Reply: We acknowledged this as a limitation of the study in page 9, lines 231-232. This is a new, unpublished technique that has promising results that we would like to share with the scientific community. We continue to follow these patients and assess them for complications.

Changes in the text: None

Authors should consider using Prolene V lok instead of PDS

Reply: We agree this may provide a more durable repair if nonabsorbable V-loc is used instead of absorbable v-loc. Upon reviewing the reasons for reoperation only 1 case was due to a broken stitch, thus it may not make much difference. We are also concerned about increasing the amount of non-absorbable foreign material at the hiatus. This will be an area of future study.

Changes in the text: Added to page 9, line 223, “We chose absorbable V-loc to decrease the nonabsorbable material burden at the hiatus, and kept the method consistent to track the outcomes.”

I am also curious why the authors are performing “Dor” in their patients. This technique of fundoplication is only relevant in the setting of Heller myotomy. Other than that, it is not



appropriate to perform a Dor.

Reply: The Dor fundoplication was done almost exclusively by one surgeon, who did 19 of the 20 reported. The choice of fundoplication varied but the focus of our paper is that all surgeons used the same hiatal closure technique.

Changes in text: None

The authors report 11% pneumothorax rate requiring a pig tail placement. This is an alarmingly high incidence of complication. It reflects a lack of surgical awareness during dissection in the mediastinum. Not being able to identify the pleural boundary during dissection is fraught with imminent danger to vital mediastinal structures.

Reply: Thile this was the most common complication, there were not any associated injuries to the surrounding structures. Many patients presented with many years of symptoms which may have contributed to increased difficulty of the dissection. Furthermore, we routinely perform esophageal mobilization high in the chest which likely contributes to this complication as well but has the benefit of esophageal lengthening without requiring collis gastroplasties. Lastly, we have not found a commonly accepted capnothorax rate for reference.

Changes in the text: None

Line 166: should read capnothorax instead of pneumothorax.

Reply: Agreed

Changes in the text: Page 7, line 166 “pneumothorax” changed to “capnothorax”

page 10, line 241 and 244 “pneumothorax” changed to “capnothorax”

Page 16, line 334 “pneumothorax” changed to “capnothorax”

“Three recurrences were due to anterior 186 dilation of the hiatus – the posterior crus repair was intact.” this is a important issue in the failed repair when one is only doing a posterior ruroplasty. A combination of both anterior and posterior cruroplasty should avert this cause of recurrence.

Reply: Currently we are only investigating the posterior cruroplasty, the addition of anterior cruroplasty is a good point and will need future investigations.

Changes in the text: none